

ASTHMA PROVIDER MANUAL

# Pediatric

Updated 2008





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# Asthma

Asthma is a complex disorder characterized by:

- Variable and recurring symptoms
- Airflow obstruction
- Bronchial hyperresponsiveness
- Underlying inflammation

Working Definition of asthma is as follows:

*Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a role: in particular mast cells, eosinophils, neutrophils (especially in sudden onset, fatal exacerbations, occupational asthma, and patients who smoke), T lymphocytes, macrophages, and epithelial cells. In susceptible individuals, this inflammation causes recurrent episodes of coughing (particularly at night or early in the morning), wheezing, breathlessness, and chest tightness. These episodes are usually associated with widespread but variable airflow obstruction that is often reversible either spontaneously or with treatment.*

*Asthma is a complex disorder characterized by: variable and recurring symptoms, airflow obstruction, bronchial hyperresponsiveness, and underlying inflammation.*

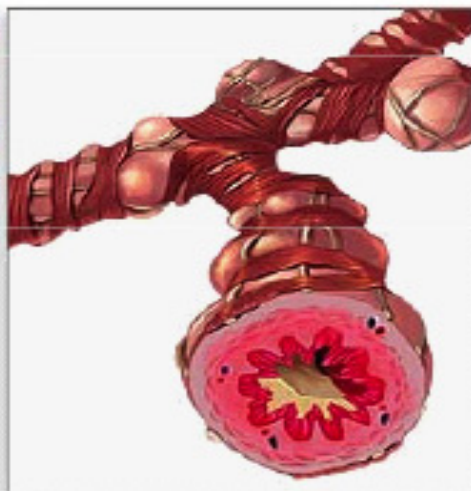
Airflow limitation is caused by a variety of changes in the airway, all influenced by airway inflammation:

- Bronchoconstriction—bronchial smooth muscle contraction that quickly narrows the airways in response to exposure to a variety of stimuli, including allergens or irritants.
- Airway hyperresponsiveness—an exaggerated bronchoconstrictor response to stimuli.
- Airway edema—as the disease becomes more persistent and inflammation becomes more progressive, edema, mucus hypersecretion, and formation of inspissated mucus plugs further limit airflow.

Normal Bronchiole



Asthmatic Bronchiole



## Causes of Asthma

The development of asthma appears to involve the interplay between host factors (particularly genetics) and environmental exposures that occur at a crucial time in the development of the immune system. A definitive cause of the inflammatory process leading to asthma has not yet been established. The following are causes of asthma at different levels:

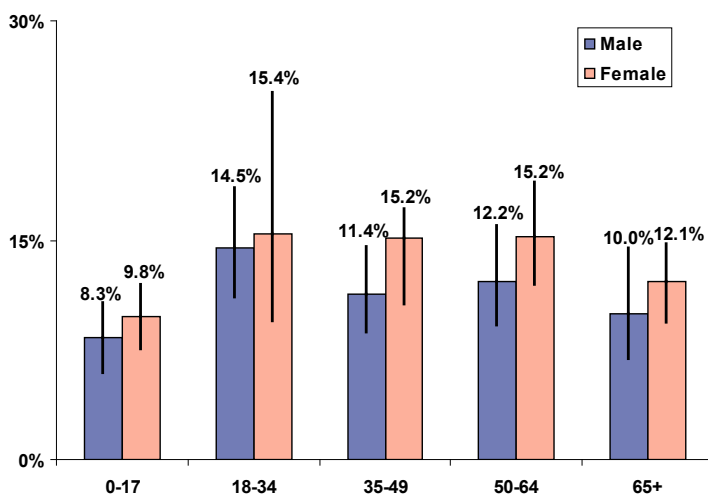
- Innate immunity
- Genetics
- Environmental factors
  - Airborne allergens
  - Viral respiratory infections
  - Tobacco smoke
  - Air pollution
  - Diet

*The development of asthma appears to involve the interplay between host factors (particularly genetics) and environmental exposures that occur at a crucial time in the development of the immune system.*

Knowledge of the importance of inflammation to the central features of asthma continues to expand and underscores inflammation as a primary target of treatment. Studies indicate that current therapeutic approaches are effective in controlling symptoms, reducing airflow limitation, and preventing exacerbations, but currently available treatments do not appear to prevent the progression of asthma in children. As various phenotypes of asthma are identified and inflammatory and genetic factors become more apparent, new therapeutic approaches may be developed that will allow even greater specificity to tailor treatment to the individual patient's needs and circumstances.

## Utah Prevalence

Prevalence of Asthma by Age and Sex for Those Who Ever Had Asthma, 2006.

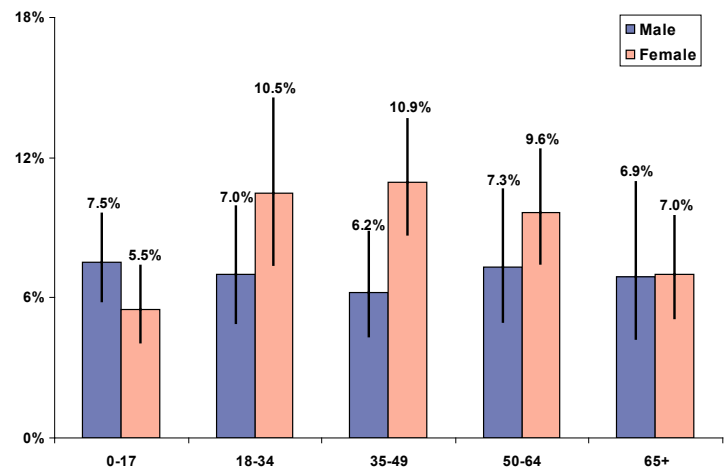


Source: Behavioral Risk Factor Surveillance System, 2006, crude rates.

Prevalence rates for those who have ever been diagnosed with asthma over the lifespan are higher for females than males in every age group. Those in the 18-34 age group show the highest prevalence of any group for both males and females having been diagnosed with asthma.

Prevalence of Current Asthma by Age and Sex, 2006.

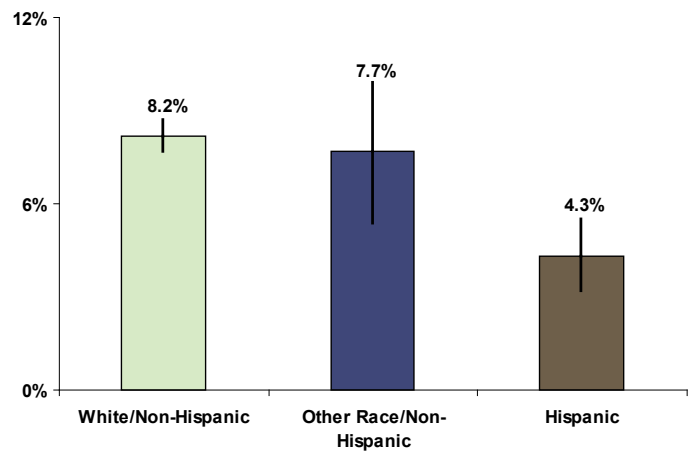
Current prevalence of asthma is defined as those who responded that they had ever been diagnosed by a doctor or other health professional as having asthma and who reported that they currently have asthma.



Source: Behavioral Risk Factor Surveillance System, 2006, crude rates.

Current prevalence of asthma is defined as those who responded that they had ever been diagnosed by a doctor or other health professional as having asthma and who reported that they currently have asthma. Males appeared to have a higher rate only in the 0-17 age group. Thereafter, females maintain a higher rate throughout the lifespan.

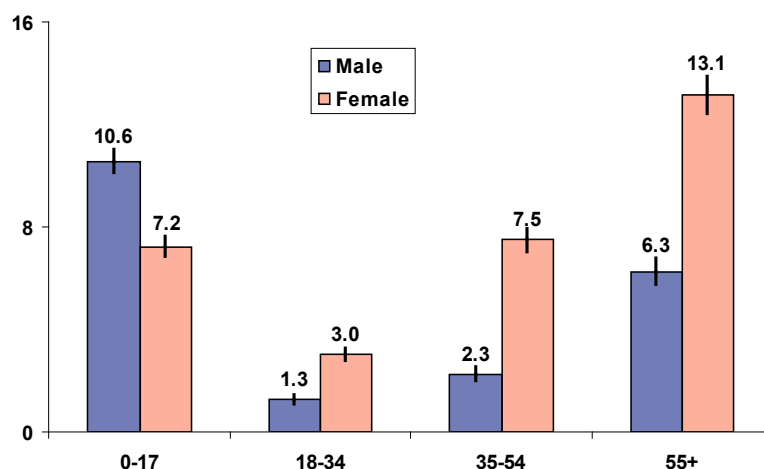
Prevalence of Asthma by Ethnicity, Adults 18 and Over, 2002-2006.



Source: Behavioral Risk Factor Surveillance System, 2006, crude rates.

Survey participants who responded that they were Hispanic had half the rate (4.3%) of asthma compared to White/Non-Hispanic adults (8.2%).

## Utah Asthma Hospitalizations by Age and Sex, 2001-2005.



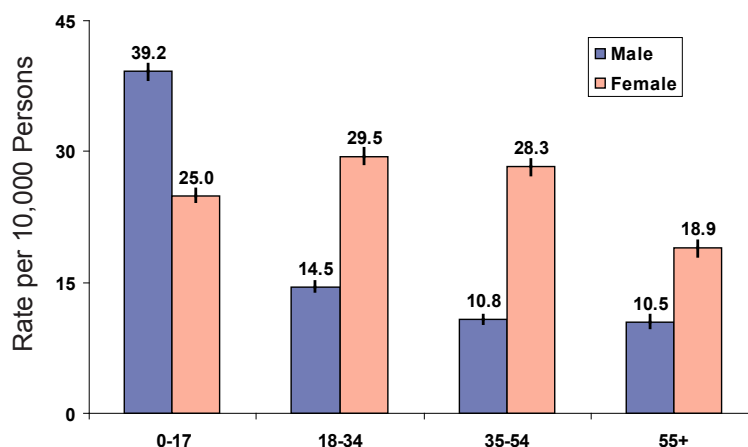
Source: Utah Hospital Discharge Database, 2001-2005, ICD Code 493. Note: An inpatient discharge occurs when a person who was admitted to a hospital leaves that hospital. A person who has been hospitalized more than once in a given calendar year will be counted multiple times as a discharge and included more than once in the hospital inpatient discharge data set; thus, the numbers in this report are for discharges, not persons.

The number of hospitalizations due to asthma in Utah increased 13.4% in the last decade, from 1,366 in 1996 to 1,549 in 2005. However, asthma hospitalization rates per 10,000 declined slightly from 6.7 per 10,000 in 1996 to 6.1 per 10,000 in 2005.

For the years 2001-2005, females in the 55+ age group had the highest asthma hospitalization crude rate of 13.1/10,000 persons, followed by males in the 0-4 age group with a rate of 10.6/10,000 persons.

During 2001-2005, Utah females had higher crude and age-adjusted asthma hospitalization rates at 7.1/10,000 and 7.5/10,000 when compared to males at 5.2/10,000 and 5.0/10,000, respectively.

## Emergency Department Encounters by Age and Sex, 2001-2005.



Source: Utah Emergency Department Encounter Database, ICD Code 493, 2001-2005.

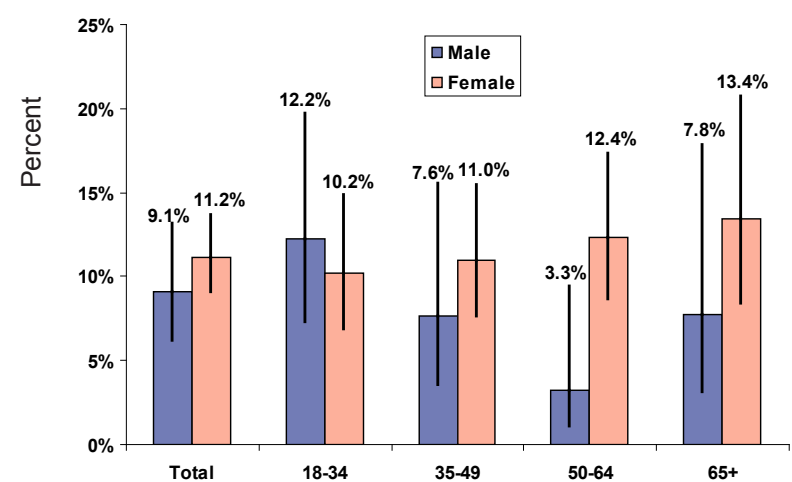
From 2001 to 2005, ED encounter rates per 10,000 persons remained stable at approximately 23/10,000 persons. Male children ages 0-17 had the highest ED encounter rate for asthma at 39.2/10,000 persons, followed by females ages 18-34, with a rate of 29.5/10,000 persons.

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Male children ages 0-17 had the highest ED encounter rate for asthma.

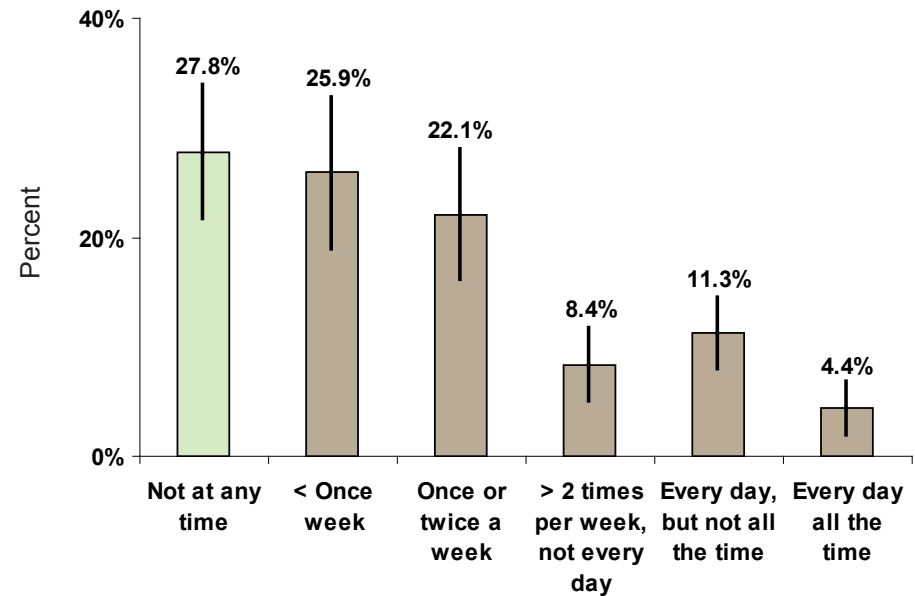


Those With Asthma Who Had at Least One Visit to an Emergency Department or Urgent Care Center in the Past 12 Months, Adults 18 and Over, 2003-2006.



Source: Behavioral Risk Factor Surveillance System, 2003-2006, crude rates.  
BRFSS survey data on visits to an emergency department show patterns similar to ED encounter rates collected from the Utah ED Encounter Database.

Frequency of Asthma Symptoms Over the Past 30 Days, Utah Adults 18 and Over, 2006.

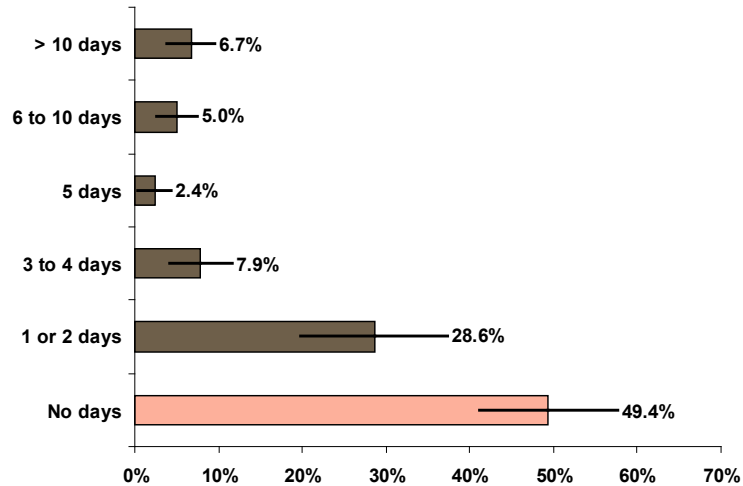


Source: Behavioral Risk Factor Surveillance System, 2006, crude rates.

*Of those who suffer from symptoms of asthma, one-quarter (25.9%) reported they have symptoms less than once per week.*

Of those who suffer from symptoms of asthma, one-quarter (25.9%) reported they have symptoms less than once per week and a little more than one-fifth (22.1%) said they have these symptoms once or twice per week. Just over one-quarter (27.8%) responded that they had not suffered symptoms of asthma at any time in the past month.

## Number of Days of Lost Sleep in the Past 30 Days Due to Symptoms of Asthma, Utah Adults 18 and Over, 2006.



Source: Behavioral Risk Factor Surveillance System, 2006, crude rates.

About one-quarter of respondents (28.6%) reported they had lost 1 or 2 days of sleep in the past 30 days due to symptoms of asthma. Just over one-fifth (22.0%) had lost 3 or more days of sleep.

## Diagnosis

To establish a diagnosis of asthma, the clinician should determine that symptoms of recurrent episodes of air flow obstruction or airway hyperresponsiveness are present; airflow obstruction is at least partially reversible; and alternative diagnoses are excluded.

Key Symptom indicators when considering a diagnosis of asthma:

- Wheezing—A lack of wheezing and a normal chest examination do not exclude asthma
- History of any of the following:
  - Cough
  - Recurrent wheeze
  - Recurrent difficulty in breathing
  - Recurrent chest tightness
- Symptoms occur or worsen in the presence of:
  - Exercise
  - Viral infection
  - Inhalant allergens (e.g., animals, dust mites, mold, pollen)
  - Irritants (tobacco, wood smoke, airborne chemicals)
  - Changes in weather
  - Strong emotional expression (laughing or crying hard)
  - Stress
  - Menstrual cycles
- Symptoms occur or worsen at night, awakening the patient

*Spirometry is an essential objective measure to establish the diagnosis of asthma because the medical history and physical examination are not reliable means of excluding other diagnoses or of assessing lung status.*

## Recommended methods to establish the diagnosis are:

*Recurrent episodes of cough and wheezing most often are due to asthma in both children and adults; however, other significant causes of airway obstruction leading to wheeze must be considered both in the initial diagnosis and if there is not clear response to initial therapy.*

- Detailed medical history
  - Symptoms
  - Pattern of symptoms
  - Precipitating and/or aggravating factors
  - Development of disease and treatment
  - Family history
  - Social history
  - History of exacerbations
  - Impact of asthma on patient and family
  - Assessment of patient's and family's perceptions of disease
- Physical examination
  - Upper respiratory tract
    - Increased nasal secretion
    - Mucosal swelling
    - Nasal polyp
  - Chest
    - Sounds of wheezing during normal breathing
    - Prolonged phase of forced exhalation
    - Hyperexpansion of the thorax
    - Use of accessory muscles
    - Appearance of hunched shoulders
    - Chest deformity
  - Skin
    - Atopic dermatitis
    - Eczema
- Spirometry
  - Demonstrates obstruction and assesses reversibility in patient  $\geq 5$  years of age
  - Patient's perceptions of airflow obstruction are highly variable.

## Differential Diagnosis

### Infants and Children

- Upper airway diseases
  - Allergic rhinitis and sinusitis
- Obstructions involving large airways
  - Foreign body in trachea or bronchus
  - Vocal cord dysfunction (VCD)
  - Vascular rings or laryngeal webs
  - Laryngotracheomalacia, tracheal stenosis, or bronchostenosis
  - Enlarged lymph nodes or tumor
- Obstruction involving small airways
  - Viral bronchiolitis or obliterative bronchiolitis
  - Cystic fibrosis
  - Bronchopulmonary dysplasia
  - Heart disease

*The chronic airway inflammatory response and structural changes that are characteristics of asthma can develop in the preschool years and appropriate asthma treatment will reduce morbidity.*

- Other causes
  - Recurrent cough not due to asthma
  - Aspiration from swallowing mechanism dysfunction or gastroesophageal reflux.

#### Common diagnostic challenges include:

- Cough variant asthma—cough can be the principal, or only, manifestation of asthma, especially in young children.
- VCD—can mimic asthma, but it is a distinct disorder. VCD may coexist with asthma but asthma medications typically do little if anything to relieve VCD symptoms.
- Gastroesophageal reflux disease (GERD), obstructive sleep apnea (OSA), and allergic bronchopulmonary aspergillosis (ABPA)
- Children ages 0-4 years—diagnosing in infants and young children is challenging and is complicated by the difficulty in obtaining objective measurements of lung function in this age group. Caution is needed to prevent prolonged use of asthma medications and well as under-diagnosing asthma.

**Consider referral to an asthma specialist if signs and symptoms are atypical, if there are problems with a differential diagnosis, or if additional testing is indicated.**

## Managing Asthma

### Assessing and monitoring asthma severity and asthma control.

The functions of assessment and monitoring are closely linked to the concepts of severity, control, and responsiveness to treatment:

- **Severity:** the intrinsic intensity of the disease process. Severity is most easily and directly measured in a patient who is not receiving long-term control therapy. Severity can also be measured once asthma control is achieved, by the step of care required to maintain control
- **Control:** the degree to which the manifestations of asthma are minimized by therapeutic intervention and the goals of therapy are met.
- **Responsiveness:** the ease with which asthma control is achieved by therapy.

### Asthma severity and asthma control include the domains of current impairment and future risk.

- **Impairment:** the frequency and intensity of symptoms and functional limitations the patient is currently experiencing or has recently experienced.
- **Risk:** the likelihood of asthma exacerbations, progressive decline in lung function (or, for children, reduced lung growth), or risk of adverse effects from medication.

This distinction emphasizes the multifaceted nature of asthma and the need to consider separately asthma's current, ongoing effects on the present quality of life and functional capacity and the future risk of adverse events. The two domains may respond differentially to treatment. For example, evidence demonstrates that some patients can have adequate control of symptoms and minimal day-to-day impairment, but still be at significant risk of exacerbations. These patient should be treated accordingly.

### **The concepts of severity and control are used as follows for managing asthma:**

- **Assess severity to initiate therapy:** a patient's initial presentation. If the patient is not currently taking long-term control medications, asthma severity is assessed to guide clinical decisions for initiating the appropriate medication and other therapeutic interventions.
- **Assess control to adjust therapy:** once therapy is initiated, the emphasis for clinical management thereafter is changed to the assessment of asthma control. The level of asthma control will guide decisions either to maintain or to adjust therapy.
- **For assessing a patient's overall asthma severity, once the most optimal asthma control is achieved and maintained:** asthma severity can be inferred by correlating the level of severity with the lowest level of treatment required to maintain control.

### **For the initial assessment to characterize the patient's asthma and guide decisions for initiating therapy, use information from the diagnostic evaluation to:**

- Classify asthma severity
- Identify precipitating factors for episodic symptoms
- Identify co-morbid conditions
- Assess the patient's knowledge and skills for self-management.

### **For periodic monitoring of asthma control to guide decisions for maintaining or adjusting therapy:**

- Instruct patients to monitor their asthma control in an ongoing manner. All patients should be taught how to recognize inadequate asthma control.
  - Either symptom or peak flow monitoring is appropriate for most patients; evidence suggests the benefits are similar.
  - Consider daily peak-flow monitoring for patients who have moderate or severe persistent asthma, patients who have a history of severe exacerbations, and patients who poorly perceive airway obstruction or worsening asthma.
- Monitor asthma control periodically in clinical visits. The frequency of monitoring is a matter of clinical judgment. In general:
  - **Schedule visits at 2 - to 6 - week** intervals for patients who are just starting therapy or who require a step up in therapy to achieve or regain asthma control.
  - **Schedule visits at 1- to 6 -month** intervals after asthma control is achieved to monitor whether asthma control is maintained. The interval will depend on factors like the duration of asthma control or the level of treatment required.
  - **Consider scheduling visits at 3- month** intervals if a step down in therapy is anticipated.

**Assess asthma control, medication technique, the written asthma action plan, adherence, and patient concerns at every patient visits.**

## Education for a Partnership in Care

A partnership between the clinician, the person who has asthma and the caregiver is required for effective asthma management. By working together, an appropriate treatment can be selected and the patient can learn self-management skills necessary to control asthma. Self-management education improves patient outcomes and can be cost-effective. Self-management education is an integral component of effective asthma care and should be treated as such by health care providers as well as by health care policies and reimbursements.

**Key educational messages: Teach and reinforce at EVERY opportunity:**

### Basic Facts about Asthma

- The contrast between airways of a person who has and a person who does not have asthma.
- The role of inflammation.
- What happens to the airways during an asthma attack.

### Role of Medications: Understanding the Difference Between:

#### Long-term control medications:

- Prevent symptoms, often by reducing inflammation
- Must be taken daily.
- Do not expect them to give quick relief.

#### Quick-relief medications:

- SABAs relax airway muscles to provide prompt relief of symptoms.
- Do not expect them to provide long-term asthma control.
- Using SABA > 2 days a week indicates the need for starting or increasing long-term control medications.

### Patient Skills

- Taking medications correctly  
inhaler technique (demonstrate to the patient and have the patient return the demonstration).
- Use of devices, as prescribed (e.g., valved holding chamber (VHC) or spacer, nebulizer).
- Identifying and avoiding environmental exposures that worsen the patient's asthma; e.g., allergens, irritants, tobacco smoke.
- Self-monitoring
- Assess level of asthma control
- Monitor symptoms and, if prescribed, peak flow measures
- Recognize early signs and symptoms of worsening asthma
- Using a written asthma action plan to know when and how to:
  - Take daily actions to control asthma
  - Adjust medication in response to signs or worsening asthma
  - Seek medical care as appropriate.

*A partnership between the clinician, the person who has asthma, and the caregiver is required for effective asthma management.*

*Asthma self-management requires repetition and reinforcement.*

### **Develop an active partnership with the patient and family by:**

- Establishing open communication that considers cultural and ethnic factors, as well as language and health care literacy needs of each patient and family.
- Identifying and addressing patient and family concerns about asthma and asthma treatment.
- Developing treatment goals and selecting medications together with the patient and family, allowing full participation in treatment decision-making.
- Encouraging self-monitoring and self-management by reviewing at each opportunity the patient's reports of asthma symptoms and response to treatment.

### **Provide to all patients a written asthma action plan that includes instructions for daily management, including:**

- Long-term control medication (if appropriate)
- Environmental control measures
- Actions to manage worsening asthma (signs/symptoms, PEF measurements [if used], that indicate worsening asthma; medications to take in response; signs/symptoms that indicate immediate medical care)
- Written asthma action plan (particularly for those with moderate or severe persistent asthma)

### **Integrate asthma self-management education into all aspects of asthma care**

- Begin at the time of diagnosis and continue through follow-up care.
- Involve all members of the health care team, including physicians, nurses, pharmacists, respiratory therapists, and asthma educators.
- Education should occur at all points of care where health care professionals interact with patients who have asthma.
- Incorporate individualized case/care management by trained health care professionals for patients who have poorly- controlled asthma.
- Use a variety of educational strategies.

### **Encourage patient's adherence to the written asthma action plan by:**

- Choosing treatment that achieves outcomes and addresses preferences that are important to patient.
- Reviewing with patient at each visit the success of the treatment plan.
- Reviewing patient's concerns
- Assessing patient's and family's level of social support.
- Tailoring the self-management approach to the needs and literacy levels of the patient.

# Control of Environmental Factors and Co-morbid Conditions that Affect Asthma.

If patients who have asthma are exposed to irritant or inhalant allergens to which they are sensitive, their asthma symptoms may increase and precipitate an asthma exacerbation. Substantially reducing exposure to these factors may reduce inflammation, symptoms, and need for medication. Several co-morbid conditions can impede asthma management.

## **Allergens and Irritants:**

- Evaluate the potential role of allergens (particularly inhalant allergens) and irritants.
  - Identify allergens and pollutants or irritant exposures. The most important allergens for both children and adults appear to be those that are inhaled.
  - For patients who have persistent asthma, use skin testing or in vitro testing to assess sensitivity to perennial indoor allergens.

## **Advise patients who have asthma to reduce exposures to allergens and pollutants or irritants to which they are sensitive:**

- Effective allergen avoidance requires a multifaceted, comprehensive approach; single steps alone are generally ineffective.
- Advise patients who have severe persistent asthma, nasal polyps, or a history of sensitivity to aspirin or nonsteroidal anti-inflammatory drugs (NSAIDs), about their risk of severe and even fatal exacerbations from using these drugs.
- Indoor air-cleaning devices cannot substitute for more effective dust-mite and cockroach control measure because these particles do not remain airborne. These devices can reduce airborne dog and cat allergens, mold spores, and tobacco smoke. However, most studies do not show an effect on symptoms or lung function.
- Humidifiers or evaporative (swamp) coolers are generally not recommended in homes of patients who are sensitive to dust mites or mold.

## **Other points to consider:**

- Subcutaneous allergen immunotherapy for patients who have persistent asthma is clear evidence of a relationship between symptoms and exposure to an allergen to which the patient is sensitive
- Consider inactivated influenza vaccination for patients who have asthma
- Dietary factors have an inconclusive role in asthma



## Co-morbid Conditions

Identify and treat co-morbid conditions that may impede asthma management. If these conditions are treated appropriately, asthma control may improve:

- Allergic bronchopulmonary aspergillosis
- Gastroesophageal reflux (GERD)
- Obese or overweight patients
- Obstructive sleep apnea
- Rhinitis or sinusitis
- Stress and depression

## Medications

### General Mechanisms and Role in Therapy

Long-term control medications are used daily to achieve and maintain control of persistent asthma. The most effective are those that attenuate the underlying inflammation characteristic of asthma. Long-term control medications include the following (listed in alphabetical order):

- Corticosteroids
- Cromolyn sodium and medocromil
- Immunomodulators
- Leukotriene modifier
- LABAs (salmeterol and formoterol)
- Methylxanthines

Quick-relief medications are used to treat acute symptoms and exacerbations. They include the following (listed in alphabetical order):

- Anticholinergics
- SABAs (albuterol, levalbuterol, and pirbuterol)
- Systemic corticosteroids

### Delivery Devices for Inhaled Medications

**Patients should be instructed in the use of inhaled medications, and patient's technique should be reviewed at every patient visit.**

The major advantages of delivering drugs directly into the lungs via inhalation are that higher concentrations can be delivered more effectively to the airways and that systemic side effects are lessened. Inhaled medications, or aerosols, are available in a variety of devices that differ in the technique required. To reduce the potential for adverse effects, the following measures are recommended:

- Advise patients to use spacers or VHCs with nonbreath-activated metered-dose inhalers (MDIs) to reduce local side effects. There are no clinical data on use of spacers with ultrafine particle hydrofluoroalkane (HFA) MDIs.
- Advise patient to rinse the mouth (rinse and spit) after inhalation.
- Use the lowest dose of ICS that maintains asthma control.

*Medications for asthma are categorized into two general classes: long-term control medication and quick-relief medication. Selection of medication includes consideration of the general mechanisms and role of the medication in therapy, delivery devices, and safety.*

*The stepwise approach and recommended treatments are meant to assist, not replace, the clinical decision-making necessary to determine the most appropriate treatment to meet the individual patient's needs and circumstances.*

*Recommendations for treatment in the different steps are presented in three different age groups because the course of the disease may change over time, the relevance of measures of impairment or risk and the potential short- and long-term impact of medication may be age-related, and varied levels of scientific evidence are available for the different ages.*

- Consider adding a LABA, or alternative adjunctive therapy, to a low or medium dose of ICS, rather than using a higher dose of ICS to maintain asthma control.

## Stepwise Approach for Managing Asthma

A stepwise approach to managing asthma is recommended to gain and maintain control of asthma in both the impairment and risk domains. These domains may respond differentially to treatment. The type, amount, and scheduling of medication is determined by the level of asthma severity or asthma control.

### General Principles for all age groups:

- Include medications, patient education, environmental control measures, and management of co-morbidities at each step.
- Monitor asthma control regularly
- For patients NOT taking long-term control therapy, select treatment based on severity
- Patients who have persistent asthma require daily long-term control medication
- Monitor level of asthma control and adjust therapy
- If possible, identify the minimum amount of medication required to maintain asthma control

### Ages 0-4 years

Consider daily long-term control therapy—young children may be at high risk for severe exacerbations, yet have low level of impairment between exacerbations.

Initiate daily long-term control therapy for:

- Children who had  $\geq 4$  episodes of wheezing the past year that lasted  $>1$  day and affected sleep AND who have a positive asthma risk profile (one of the following):
  - Parental history of asthma
  - Atopic dermatitis
  - Evidence of sensitization to aeroallergens
- OR two of the following;
  - Sensitization to foods
  - $\geq 4$  percent blood eosinophilia
  - Wheezing apart from colds
- Consider initiating daily long-term control therapy for:
  - Children who consistently require SABA  $>2$  days per week for  $>4$  weeks.
  - Children who have two exacerbations requiring oral systemic corticosteroids within 6 months.

*Promote active participation in physical activities, exercise, and sports because physical activity is an essential part of a child's life*

- Monitor response closely, and adjust treatment
  - If no clear and positive response occurs with 4-6 weeks and the patient's/caregiver's medication technique and adherence are satisfactory, stop the treatment and consider alternative therapies or diagnosis.
  - If clear benefit is sustained for at least 3 months, consider step down to evaluate the continued need for daily therapy. Children this age have high rates of spontaneous remission of symptoms.

## **Ages 5-11 Years**

- Involve child in developing a written asthma action plan
  - Address youth's concerns, preferences, and school schedule in selecting treatment
  - Encourage students to take a copy of written action plan to school/ after-school activities
- Promote physical activity
  - Treat exercise-induced bronchospasm (EIB). Step up daily therapy if the child has poor endurance or symptoms during normal play activities
- Monitor for disease progression and loss of lung growth
  - Treatment will not alter underlying progression of the disease but a step up in therapy may be required to maintain asthma control.

## **Ages 12 and older**

- Involve youths in developing a written asthma action plan
  - Address youth's concerns, preferences, and school schedule in selecting treatment
  - Encourage students to take a copy of written action plat to school/ after-school activities
- Promote physical activity
  - Treat exercise-induced bronchospasm (EIB). Step up daily therapy if the child has poor endurance or symptoms during normal daily activities

Components of Severity		Classifying Asthma Severity and Initiating Therapy in Children							
		Intermittent		Persistent					
				Mild		Moderate		Severe	
		Ages 0–4	Ages 5–11	Ages 0–4	Ages 5–11	Ages 0–4	Ages 5–11	Ages 0–4	Ages 5–11
Impairment	Symptoms	≤2 days/week		>2 days/week but not daily		Daily		Throughout the day	
	Nighttime awakenings	0	≤2x/month	1–2x/month	3–4x/month	3–4x/month	>1x/week but not nightly	>1x/week	Often 7x/week
	Short-acting beta <sub>2</sub> -agonist use for symptom control	≤2 days/week		>2 days/week but not daily		Daily		Several times per day	
	Interference with normal activity	None		Minor limitation		Some limitation		Extremely limited	
	Lung Function		Normal FEV <sub>1</sub> between exacerbations						
	• FEV <sub>1</sub> (predicted) or peak flow (personal best)	N/A	>80%	N/A	>80%	N/A	60–80%	N/A	<60%
• FEV <sub>1</sub> /FVC		>85%		>80%		75–80%		<75%	
Risk	Exacerbations requiring oral systemic corticosteroids (consider severity and interval since last exacerbation)	0–1/year (see notes)		≥2 exacerbations in 6 months requiring oral systemic corticosteroids, or ≥4 wheezing episodes/1 year lasting >1 day AND risk factors for persistent asthma	≥2x/year (see notes)  Relative annual risk may be related to FEV <sub>1</sub>				
Recommended Step for Initiating Therapy  (See “Stepwise Approach for Managing Asthma” for treatment steps.)  The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.		Step 1 (for both age groups)		Step 2 (for both age groups)		Step 3 and consider short course of oral systemic corticosteroids	Step 3: medium-dose ICS option and consider short course of oral systemic corticosteroids	Step 3 and consider short course of oral systemic corticosteroids	Step 3: medium-dose ICS option OR step 4 and consider short course of oral systemic corticosteroids
In 2–6 weeks, depending on severity, evaluate level of asthma control that is achieved. • Children 0–4 years old: If no clear benefit is observed in 4–6 weeks, stop treatment and consider alternative diagnoses or adjusting therapy. • Children 5–11 years old: Adjust therapy accordingly.									

Key: FEV<sub>1</sub>, forced expiratory volume in 1 second;

FVC, forced vital capacity; CS, inhaled corticosteroids; ICU, intensive care unit; N/A, not applicable

Notes:

n Level of severity is determined by both impairment and risk. Assess impairment domain by caregiver’s recall of previous 2–4 weeks. Assign severity to the most severe category in which any feature occurs. n Frequency and severity of exacerbations may fluctuate over time for patients in any severity category. At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma severity. In general, more frequent and severe exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate greater underlying disease severity. For treatment purposes, patients with ≥2 exacerbations described above may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

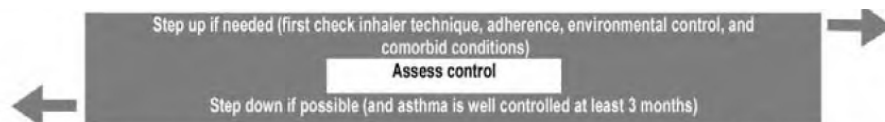
Components of Control		Assessing Asthma Control and Adjusting Therapy in Children					
		Well Controlled		Not Well Controlled		Very Poorly Controlled	
		Ages 0–4	Ages 5–11	Ages 0–4	Ages 5–11	Ages 0–4	Ages 5–11
Impairment	Symptoms	≤2 days/week but not more than once on each day		>2 days/week or multiple times on ≤2 days/week		Throughout the day	
	Nighttime awakenings	≤1x/month		>1x/month	≥2x/month	>1x/week	≥2x/week
	Interference with normal activity	None		Some limitation		Extremely limited	
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week		>2 days/week		Several times per day	
	Lung function <ul style="list-style-type: none"><li>• FEV<sub>1</sub> (predicted) or peak flow personal best</li><li>• FEV<sub>1</sub>/FVC</li></ul>	N/A	>80%	N/A	60–80% 75–80%	N/A	<60% <75%
Risk	Exacerbations requiring oral systemic corticosteroids	0–1x/year		2–3x/year	≥2x/year	>3x/year	≥2x/year
	Reduction in lung growth	N/A	Requires long-term followup	N/A		N/A	
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.					
<b>Recommended Action for Treatment</b>  (See “Stepwise Approach for Managing Asthma” for treatment steps.)  The stepwise approach is meant to assist, not replace, clinical decisionmaking required to meet individual patient needs.		<ul style="list-style-type: none"><li>• Maintain current step.</li><li>• Regular followup every 1–6 months.</li><li>• Consider step down if well controlled for at least 3 months.</li></ul>		Step up 1 step	Step up at least 1 step	<ul style="list-style-type: none"><li>• Consider short course of oral systemic corticosteroids,</li><li>• Step up 1–2 steps</li></ul>	
			<ul style="list-style-type: none"><li>• <b>Before step up:</b> Review adherence to medication, inhaler technique, and environmental control. If alternative treatment was used, discontinue it and use preferred treatment for that step.</li><li>• <b>Reevaluate the level of asthma control in 2–6 weeks to achieve control; every 1–6 months to maintain control.</b> Children 0–4 years old: If no clear benefit is observed in 4–6 weeks, consider alternative diagnoses or adjusting therapy. Children 5–11 years old: Adjust therapy accordingly.</li><li>• For side effects, consider alternative treatment options.</li></ul>				

Key: EIB, exercise-induced bronchospasm, FEV<sub>1</sub>, forced expiratory volume in 1 second; FVC, forced vital capacity; ICU, intensive care unit; N/A, not applicable




Notes:

n The level of control is based on the most severe impairment or risk category. Assess impairment domain by patient's or caregiver's recall of previous 2–4 weeks. Symptom assessment for longer periods should reflect a global assessment, such as whether the patient's asthma is better or worse since the last visit. n At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma control. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate poorer disease control.





		Step 1					Step 2		Step 3		Step 4		Step 5		Step 6		Notes	
Children 0–4 Years of Age		Intermittent Asthma		Persistent Asthma: Daily Medication												<ul style="list-style-type: none"><li>The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.</li><li>If an alternative treatment is used and response is inadequate, discontinue it and use the preferred treatment before stepping up.</li><li>If clear benefit is not observed within 4–6 weeks, and patient's/family's medication technique and adherence are satisfactory, consider adjusting therapy or an alternative diagnosis.</li><li>Studies on children 0–4 years of age are limited. Step 2 preferred therapy is based on Evidence A. All other recommendations are based on expert opinion and extrapolation from studies in older children.</li><li>Clinicians who administer immunotherapy should be prepared and equipped to identify and treat anaphylaxis that may occur.</li></ul> <p><b>Key: Alphabetical listing is used when more than one treatment option is listed within either preferred or alternative therapy.</b> ICS, inhaled corticosteroid; LABA, inhaled long-acting beta<sub>2</sub>-agonist; LTRA, leukotriene receptor antagonist; oral corticosteroids, oral systemic corticosteroids; SABA, inhaled short-acting beta<sub>2</sub>-agonist</p>		
	Preferred	SABA PRN	Low-dose ICS	Medium-dose ICS	Medium-dose ICS	Medium-dose ICS + LABA or Montelukast	High-dose ICS	High-dose ICS	High-dose ICS + LABA or Montelukast	High-dose ICS + Oral corticosteroids	High-dose ICS + LABA or Montelukast	High-dose ICS + LABA or Montelukast	High-dose ICS + LABA or Montelukast	High-dose ICS + LABA or Montelukast	High-dose ICS + LABA or Montelukast		High-dose ICS + LABA or Montelukast	
	Alternative		Cromolyn or Montelukast															
	Quick-Relief Medication	<p><b>Each Step: Patient Education and Environmental Control</b></p> <ul style="list-style-type: none"><li>SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms.</li><li>With viral respiratory symptoms: SABA q 4–6 hours up to 24 hours (longer with physician consult). Consider short course of oral systemic corticosteroids if exacerbation is severe or patient has history of previous severe exacerbations.</li></ul> <p>Caution: Frequent use of SABA may indicate the need to step up treatment. See text for recommendations on initiating daily long-term-control therapy.</p>																
Children 5–11 Years of Age		Intermittent Asthma		Persistent Asthma: Daily Medication												<ul style="list-style-type: none"><li>The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.</li><li>If an alternative treatment is used and response is inadequate, discontinue it and use the preferred treatment before stepping up.</li><li>Theophylline is a less desirable alternative due to the need to monitor serum concentration levels.</li><li>Steps 1 and 2 medications are based on Evidence A. Step 3 ICS and ICS plus adjunctive therapy are based on Evidence B for efficacy of each treatment and extrapolation from comparator trials in older children and adults—comparator trials are not available for this age group; steps 4–6 are based on expert opinion and extrapolation from studies in older children and adults.</li><li>Immunotherapy for steps 2–4 is based on Evidence B for house-dust mites, animal danders, and pollens; evidence is weak or lacking for molds and cockroaches. Evidence is strongest for immunotherapy with single allergens. The role of allergy in asthma is greater in children than adults.</li><li>Clinicians who administer immunotherapy should be prepared and equipped to identify and treat anaphylaxis that may occur.</li></ul> <p><b>Key: Alphabetical listing is used when more than one treatment option is listed within either preferred or alternative therapy.</b> ICS, inhaled corticosteroid; LABA, inhaled long-acting beta<sub>2</sub>-agonist; LTRA, leukotriene receptor antagonist; SABA, inhaled short-acting beta<sub>2</sub>-agonist</p>		
	Preferred	SABA PRN	Low-dose ICS	Low-dose ICS + LABA, LTRA, or Theophylline	Low-dose ICS + LABA, LTRA, or Theophylline	Medium-dose ICS + LABA	Medium-dose ICS + LABA	High-dose ICS + LABA	High-dose ICS + LABA	High-dose ICS + LABA	High-dose ICS + LABA	High-dose ICS + LABA	High-dose ICS + LABA	High-dose ICS + LABA	High-dose ICS + LABA		High-dose ICS + LABA	
	Alternative		Cromolyn, LTRA, Nedocromil, or Theophylline	OR	Medium-dose ICS	Medium-dose ICS + LABA, LTRA, or Theophylline	Medium-dose ICS + LABA, LTRA, or Theophylline	High-dose ICS + LABA, LTRA, or Theophylline	High-dose ICS + LABA, LTRA, or Theophylline	High-dose ICS + LABA, LTRA, or Theophylline	High-dose ICS + LABA, LTRA, or Theophylline	High-dose ICS + LABA, LTRA, or Theophylline	High-dose ICS + LABA, LTRA, or Theophylline	High-dose ICS + LABA, LTRA, or Theophylline	High-dose ICS + LABA, LTRA, or Theophylline		High-dose ICS + LABA, LTRA, or Theophylline	
	Quick-Relief Medication	<p><b>Each Step: Patient Education, Environmental Control, and Management of Comorbidities</b></p> <p>Steps 2–4: Consider subcutaneous allergen immunotherapy for patients who have persistent, allergic asthma.</p> <ul style="list-style-type: none"><li>SABA as needed for symptoms. Intensity of treatment depends on severity of symptoms: up to 3 treatments at 20-minute intervals as needed. Short course of oral systemic corticosteroids may be needed.</li></ul> <p>Caution: Increasing use of SABA or use &gt;2 days a week for symptom relief (not prevention of EIB) generally indicates inadequate control and the need to step up treatment.</p>																

Components of Severity		Classification of Asthma Severity ≥12 years of age			
		Intermittent	Persistent		
			Mild	Moderate	Severe
<b>Impairment</b>  Normal FEV <sub>1</sub> /FVC: 8–19 yr 85% 20–39 yr 80% 40–59 yr 75% 60–80 yr 70%	Symptoms	≤2 days/week	>2 days/week but not daily	Daily	Throughout the day
	Nighttime awakenings	≤2x/month	3–4x/month	>1x/week but not nightly	Often 7x/week
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week but not daily, and not more than 1x on any day	Daily	Several times per day
	Interference with normal activity	None	Minor limitation	Some limitation	Extremely limited
	Lung function	<ul style="list-style-type: none"><li>• Normal FEV<sub>1</sub> between exacerbations</li><li>• FEV<sub>1</sub> &gt;80% predicted</li><li>• FEV<sub>1</sub>/FVC normal</li></ul>	<ul style="list-style-type: none"><li>• FEV<sub>1</sub> &gt;80% predicted</li><li>• FEV<sub>1</sub>/FVC normal</li></ul>	<ul style="list-style-type: none"><li>• FEV<sub>1</sub> &gt;60% but &lt;80% predicted</li><li>• FEV<sub>1</sub>/FVC reduced 5%</li></ul>	<ul style="list-style-type: none"><li>• FEV<sub>1</sub> &lt;60% predicted</li><li>• FEV<sub>1</sub>/FVC reduced &gt;5%</li></ul>
<b>Risk</b>	Exacerbations requiring oral systemic corticosteroids	0–1/year (see note)	≥2/year (see note) 		
		 Consider severity and interval since last exacerbation.  Frequency and severity may fluctuate over time for patients in any severity category.  Relative annual risk of exacerbations may be related to FEV <sub>1</sub> .			
<b>Recommended Step for Initiating Treatment</b> (See “Stepwise Approach for Managing Asthma” for treatment steps.)		Step 1	Step 2	Step 3	Step 4 or 5
		and consider short course of oral systemic corticosteroids			
		In 2–6 weeks, evaluate level of asthma control that is achieved and adjust therapy accordingly.			

Key: EIB, exercise-induced bronchospasm,

FEV<sub>1</sub>, forced expiratory

volume in 1 second; FVC, forced vital

capacity; ICU, intensive care unit

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.

- Level of severity is determined by assessment of both impairment and risk. Assess impairment domain by patient's/ caregiver's recall of previous 2–4 weeks and spirometry. Assign severity to the most severe category in which any feature occurs.

- At present, there are inadequate data to correspond frequencies of exacerbations with different levels of asthma severity. In general, more frequent and intense exacerbations (e.g., requiring urgent, unscheduled care, hospitalization, or ICU admission) indicate greater underlying disease severity. For treatment purposes, patients who had ≥2 exacerbations requiring oral systemic corticosteroids in the past year may be considered the same as patients who have persistent asthma, even in the absence of impairment levels consistent with persistent asthma.

Components of Control		Classification of Asthma Control (≥12 years of age)		
		Well Controlled	Not Well Controlled	Very Poorly Controlled
Impairment	Symptoms	≤2 days/week	>2 days/week	Throughout the day
	Nighttime awakenings	≤2x/month	1–3x/week	≥4x/week
	Interference with normal activity	None	Some limitation	Extremely limited
	Short-acting beta <sub>2</sub> -agonist use for symptom control (not prevention of EIB)	≤2 days/week	>2 days/week	Several times per day
	FEV <sub>1</sub> or peak flow	>80% predicted/ personal best	60–80% predicted/ personal best	<60% predicted/ personal best
	Validated questionnaires  ATAQ ACQ ACT	0 ≤0.75* ≥20	1–2 ≥1.5 16–19	3–4 N/A ≤15
Risk	Exacerbations requiring oral systemic corticosteroids	0–1/year	≥2/year (see note)	
		Consider severity and interval since last exacerbation		
	Progressive loss of lung function	Evaluation requires long-term followup care.		
	Treatment-related adverse effects	Medication side effects can vary in intensity from none to very troublesome and worrisome. The level of intensity does not correlate to specific levels of control but should be considered in the overall assessment of risk.		
Recommended Action for Treatment  (See “Stepwise Approach for Managing Asthma” for treatment steps.)		<ul style="list-style-type: none"><li>• Maintain current step.</li><li>• Regular followup at every 1–6 months to maintain control.</li><li>• Consider step down if well controlled for at least 3 months.</li></ul>	<ul style="list-style-type: none"><li>• Step up 1 step.</li><li>• Reevaluate in 2–6 weeks.</li><li>• For side effects, consider alternative treatment options.</li></ul>	<ul style="list-style-type: none"><li>• Consider short course of oral systemic corticosteroids.</li><li>• Step up 1–2 steps.</li><li>• Reevaluate in 2 weeks.</li><li>• For side effects, consider alternative treatment options.</li></ul>

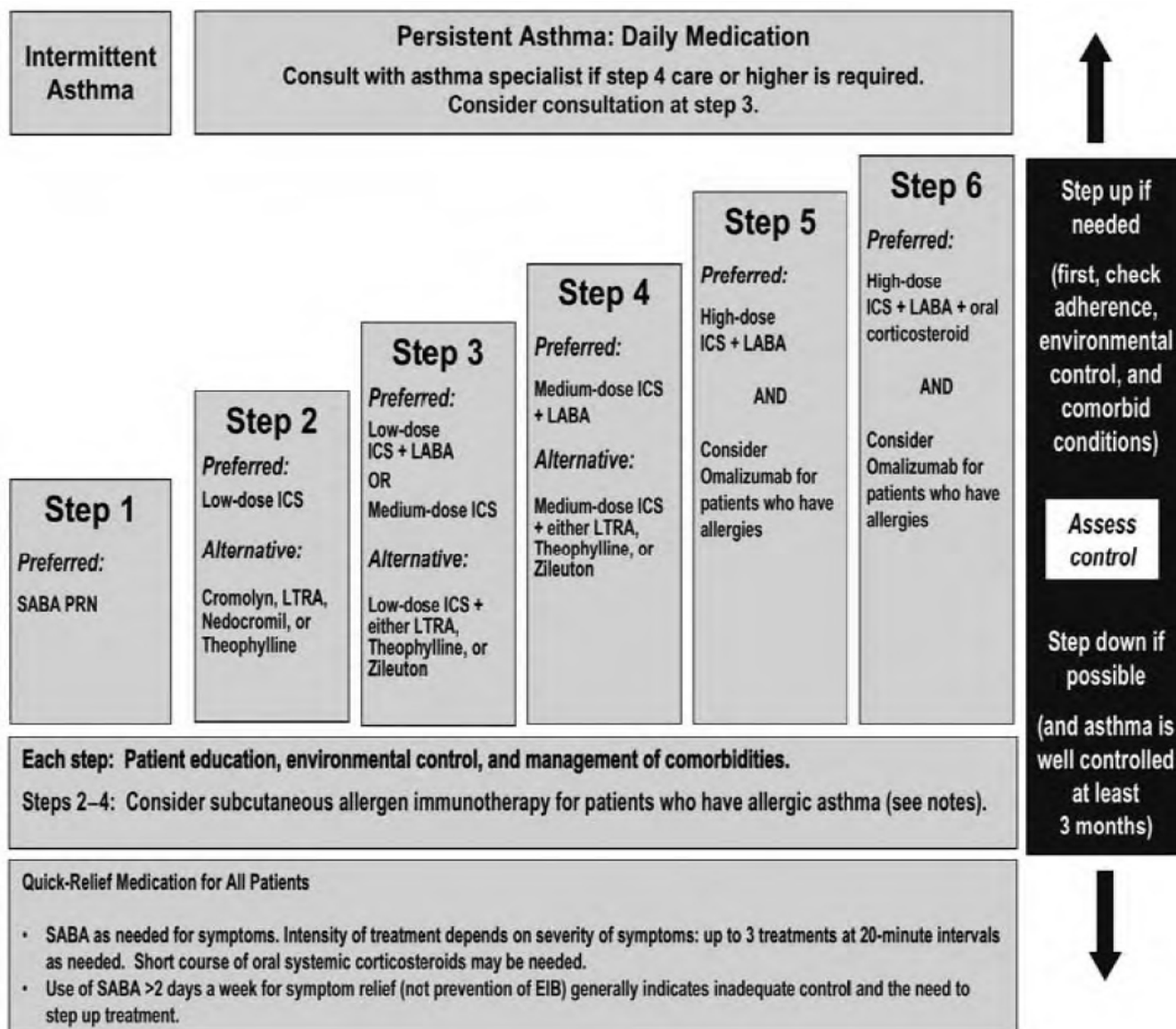
\*ACQ values of 0.76–1.4 are indeterminate regarding well-controlled asthma.

Key: EIB, exercise-induced bronchospasm; ICU, intensive care unit.

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking require to meet individual patient needs.
- The level of control is based on the most severe impairment or risk category. Assess impairment domain by patient's recall of previous 2–4 weeks and by spirometry/or peak flow measures. Symptom assessment for longer periods should reflect a global assessment, such as inquiring whether the patient's asthma is better or worse since the last visit. Impairment levels consistent with not-well-controlled asthma. ATAQ = Asthma Therapy Assessment Questionnaire© ACQ = Asthma Control Questionnaire© ACT = Asthma Control Test™ Minimal Important Difference: 1.0 for the ATAQ; 0.5 for the ACQ; not determined for the ACT. Before step up in therapy:
  - Review adherence to medication, inhaler technique, environmental control, and comorbid conditions.
  - If an alternative treatment option was used in a step, discontinue and use the preferred treatment for that step.





Key: Alphabetical order is used when more than one treatment option is listed within either preferred or alternative therapy. ICS, inhaled corticosteroid; LABA, longacting inhaled beta2-agonist; LTRA, leukotriene receptorantagonist; SABA, inhaled short-acting beta2agonist

Notes:

- The stepwise approach is meant to assist, not replace, the clinical decisionmaking required to meet individual patient needs.
- If alternative treatment is used and response is inadequate, discontinue it and use the preferred treatment before stepping up.
- Zileuton is a less desirable alternative due to limited studies as adjunctive therapy and the need to monitor liver function. Theophylline requires monitoring of serum concentration levels.
- In step 6, before oral corticosteroids are introduced, a trial of high-dose ICS + LABA + either LTRA, theophylline, or zileuton may be considered, although this approach has not been studied in clinical trials. Step 1, 2, and 3 preferred therapies are based on Evidence A; step 3 alternative therapy is based on Evidence A for LTRA, Evidence B for theophylline, and Evidence D for zileuton. Step 4 preferred therapy is based on Evidence B, and alternative therapy is based on Evidence B for LTRA and theophylline and Evidence D for zileuton. Step 5 preferred therapy is based on Evidence B. Step 6 preferred therapy is based on (EPR—2 1997) and Evidence B for omalizumab.
- Immunotherapy for steps 2–4 is based on Evidence B for house-dust mites, animal danders, and pollens; evidence is weak or lacking for molds and cockroaches. Evidence is strongest for immunotherapy with single allergens. The role of allergy in asthma is greater in children than in adults.
- Clinicians who administer immunotherapy or omalizumab should be prepared and equipped to identify and treat anaphylaxis that may occur.

# Special Situations

## Exercised-induced Bronchospasm (EIB)

- Prevent EIB: treatment strategies to prevent EIB include:
  - Long-term control therapy
  - Pretreatment before exercise with SABA, leukotriene receptor antagonists (LTRAs), cromolyn or nedocromil; frequent or chronic use of long acting beta2-agonist (LABA) for pretreatment is discouraged, as it may disguise poorly controlled persistent asthma.
  - Warm-up period or a mask or scarf over the mouth for cold-induced EIB.

## Home Management

- Develop a written asthma action plan: Instruct patient how to:
  - Recognize early signs, symptoms, and peak expiratory flow (PEF) measures that indicate worsening asthma.
  - Adjust medications and remove or withdraw from environmental factors contributing to the exacerbation.

Monitor response and seek medical care if there is a serious deterioration or lack of response to treatment. Consider a referral to an asthma specialist for consultation or comanagement if:

- There are difficulties achieving or maintaining control
- The patient requires >2 bursts of oral systemic corticosteroids in 1 year or has an exacerbation requiring hospitalization.
- Step 4 care or higher is required (step 3 or higher for children 0-4)
- Immunotherapy or omalizumab is considered
- Additional testing is indicated.

## Asthma in School

Asthma is the single most common cause of missed school days. Ask the student and parents about school attendance and participation in physical activities. School nurses, faculty, and staff need to be aware of each student who has asthma. In order to ensure the safety of a child with asthma, there are many tools that should be used in the school setting.

## Disparities

Multiple factors contribute to the higher rates of poorly controlled asthma and asthma deaths among Blacks and Latinos compared to Whites. These factors include socioeconomic disparities in access to quality medical care, under prescription and under utilization of long-term control medication, cultural beliefs and practices about asthma management and perhaps biological and pathophysiological differences that affect the underlying severity of asthma and response to treatment.

*Heightened awareness of disparities and cultural barriers, improving access to quality of care, and improving communication strategies between clinicians and ethnic or racial minority patients regarding the use of asthma medications may improve asthma outcomes.*

# Additional Resources

## Allergy and Asthma Survival Guide

A Web site by the American Academy of Allergy, Asthma, and Immunology, with multiple links to topics relating to asthma and allergies

[www.aaaai.org/springallergy/understanding\\_allergic\\_asthma.stm](http://www.aaaai.org/springallergy/understanding_allergic_asthma.stm)

## The Link Between Allergies and Asthma

A Web page from the Mayo Clinic discussing the link between allergies and asthma for parents, patients, families.

[www.mayoclinic.com/health/allergies\\_and\\_asthma/AA00045/MOTT=D500021](http://www.mayoclinic.com/health/allergies_and_asthma/AA00045/MOTT=D500021)

## How to Help Your Child with Allergies and Asthma

A two-page document by the American Academy of Allergies, Asthma & Immunology for parents.

## Allergy Medications

A Web page from the Mayo Clinic Web site listing allergy medications by category with links to detailed information about each medication.

[www.mayoclinic.com/health/allergy\\_medications/AA00054](http://www.mayoclinic.com/health/allergy_medications/AA00054)

## Allergic Rhinitis

A handout from the American Academy of Allergy, Asthma, and Immunology explaining allergic rhinitis to parents, patients, families.

## Patient Action Plan

### *Utah School Asthma Action Plan*

From the Utah Department of Health, one page describing the three zones of symptoms and the appropriate action in the school setting. Requires signature of physician, parent, teacher, and school nurse. (also in Spanish)

## Asthma attack warning signs

### *Utah School Asthma Emergency Protocol*

From the Utah Department of Health Asthma Protocol for school personnel (also in Spanish)

### *Medication Self-Administration Form*

Form for Self-Administration of Asthma Medications in School. A one page document by the Utah Department of Health for physicians to fill out. It gives a student permission to self-administer inhaled asthma medications.

## Preventing exercise-induced

### *Winning with Asthma*

An excellent thirty-minute educational video clip for coaches at all levels to improve their understanding of asthma and to train them how to help their athletes who suffer from asthma. Requires downloading Flash Player 8. [www.winningwithasthma.org/](http://www.winningwithasthma.org/)

### *Addressing Asthma in Schools*

From the Centers for Disease Control and Prevention/  
Division of Adolescent and School Health for school  
administrators and school personnel [www.cdc.gov/  
healthyYouth/asthma/pdf/asthma/asthma.pdf](http://www.cdc.gov/healthyYouth/asthma/pdf/asthma/asthma.pdf)

### *Utah Asthma School Resource Manual*

[www.health.utah.gov/asthma/PDF%20files/scholl%20  
Manual.pdf](http://www.health.utah.gov/asthma/PDF%20files/scholl%20Manual.pdf)

## **Air Quality**

### *Air Quality Tool Kit for Schools*

A Web site from the Environmental Protection Agency  
where you can order the IAQ Tools for Schools Kits or  
select individual pdf. files to download.

### *Utah School Guide for Interpreting the Air Quality Index*

A handout from the Utah Department of Health Asthma  
Project for school personnel to determine indoor/outdoor physical  
activities

\*all resources above can be found at: [www.health.utah.gov/asthma](http://www.health.utah.gov/asthma)

## Example: Asthma Action Plan

Date \_\_\_\_\_ Patient name \_\_\_\_\_ DOB \_\_\_\_\_  
 MD \_\_\_\_\_ MRN \_\_\_\_\_ ☐ Reviewed with: guardian/patient Verbalized understanding ☐ yes ☐ no

# Asthma ACTION PLAN

- ☐ Breathing is easy
- ☐ No coughing
- ☐ No wheezing
- ☐ No shortness of breath
- ☐ Can work, play, and sleep easily
- ☐ Using quick-relief medication less than twice a week
- ☐ **PEAK FLOW**  
80%–100% of personal best

**go**  
maintain therapy

- ☐ Using quick-relief medication more than twice a week\*
- ☐ Coughing
- ☐ Wheezing
- ☐ Shortness of breath
- ☐ Difficulty with physical activity
- ☐ Waking at night
- ☐ Tightness in chest
- ☐ **PEAK FLOW**  
50%–80% of personal best

**caution**  
step up therapy

\*You might need a change in your treatment plan

- ☐ Medication is not helping
- ☐ Breathing is very difficult
- ☐ Cannot walk or play
- ☐ Cannot talk easily
- ☐ **PEAK FLOW**  
Less than 50% of personal best

**stop**  
get help now

Avoid these asthma triggers: \_\_\_\_\_

Take CONTROLLER medication: \_\_\_\_\_

Take QUICK-RELIEF medication:

☐ Before exercise: \_\_\_\_\_

☐ Before exposure to a trigger: \_\_\_\_\_

Keep ORAL STEROIDS on hand in case you fall into STEP 3 of the yellow zone or into the red zone.

STEP 1: Add QUICK-RELIEF medication:

STEP 2: Monitor your symptoms:

- If symptoms **GO AWAY** quickly, return to the green zone.
- If symptoms **CONTINUE** or return within a few hours:

☐ Add \_\_\_\_\_

STEP 3: Continue monitoring your symptoms:

- If symptoms **CONTINUE** after step 2 treatment:

☐ Add \_\_\_\_\_  
oral steroid medication

☐ Call your healthcare provider: \_\_\_\_\_

☐ Call your healthcare provider: \_\_\_\_\_  
 If you can't reach your healthcare provider quickly, go to the nearest hospital emergency room or call 911 immediately.

☐ Go to the hospital emergency room or call 911 immediately.

- If you have an oral steroid at home, take \_\_\_\_\_mg of \_\_\_\_\_ as you leave for the hospital.

- Continue to use your quick-relief medication \_\_\_\_\_ as you go to the emergency room.

*Asthma symptoms can get worse quickly. When in doubt, seek medical help.*

# Additional Resources

American Academy of Allergy, Asthma, and Immunology

[www.aaaai.org/patients/publicedmat/tips/asthmaandpregnancy.stm](http://www.aaaai.org/patients/publicedmat/tips/asthmaandpregnancy.stm)

[www.aaaai.org/patients/seniorsandasthma/gerd.stm](http://www.aaaai.org/patients/seniorsandasthma/gerd.stm)

[www.aaaai.org/patients/seniorsandasthma/asthma\\_emergency.stm](http://www.aaaai.org/patients/seniorsandasthma/asthma_emergency.stm)

[www.aaaai.org/patients/publicedmat/tips/occupationalasthma.stm](http://www.aaaai.org/patients/publicedmat/tips/occupationalasthma.stm)

Environmental Protection Agency

[www.epa.gov/aging/solutions/Solutions6\\_1.pdfma/asthlrc.html](http://www.epa.gov/aging/solutions/Solutions6_1.pdfma/asthlrc.html)

Mayo Clinic

<http://www.mayoclinic.com/health/occupational-asthma/DS00591>

NAEPP Guidelines for Asthma in the Elderly

[http://www.nhlbi.nih.gov/health/prof/lung/asthma/as\\_elder.pdf](http://www.nhlbi.nih.gov/health/prof/lung/asthma/as_elder.pdf)

National Jewish Medical Center

<http://www.njc.org/>

<http://www.nationaljewish.org/disease-info/diseases/asthma/about/types/occupation.aspx>

National Heart, Lung, and Blood Institute

[www.nih.gov/news/pr/jan2005/nhlbi-11.htm](http://www.nih.gov/news/pr/jan2005/nhlbi-11.htm)

<http://www.nhlbi.nih.gov/health/prof/lung/asthma/astpreg.htm>

Occupational, Safety and Health Administration (OSHA)

<http://www.osha.gov/SLTC/occupationalasthma/>

<http://Familydoctor.org/040.sml?printxml>

Pregnancy and Asthma

<http://www.aaaai.org/patients/advocate/2003/spring/women.stm>

Womenshealth.gov

[www.womenshealth.gov/pub/steps/Asthma.htm](http://www.womenshealth.gov/pub/steps/Asthma.htm)

Traveling with Asthma

[www.aaaai.org/patients/publicedmat/tips/travelinewithallergies.stm](http://www.aaaai.org/patients/publicedmat/tips/travelinewithallergies.stm)

# References

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## **Asthma in Utah 2007 - Update.**

Utah Asthma Program, Bureau of Health Promotion, Utah Department of Health; (2007)

[http://www.health.utah.gov/asthma/pdf\\_files/Data/Burden\\_%20Report.pdf](http://www.health.utah.gov/asthma/pdf_files/Data/Burden_%20Report.pdf)

Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma, Clinical Practice Guidelines.

National Asthma Education and Prevention Program of the

National Heart, Lung, and Blood Institute, National Institutes of Health; (2007)

## For more information

The National Heart, Lung, and Blood Institute (NHLBI) Health Information Center is a service of the NHLBI of the Nation Institutes of Health. The NHLBI Health Information Center provides information to health professionals, patients , and the public about th treatment, diagnosis, and prevention of heart, lung, and blood diseases and sleep disorders. For more information; contact:

NHLBI Health Information Center

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